SCALABLE DISPLAY OF INTERNET CONTENT ON MOBILE DEVICES

RELATED APPLICATIONS

The present application is a Divisional Application of U.S. application Ser. No. 09/878,097, filed Jun. 8, 2001, now U.S. Pat. No. 7,210,099, which is a Continuation-in-Part of U.S. Non-Provisional application Ser. No. 09/828,511, filed Apr. 7, 2001, now abandoned, entitled "RESOLUTION INDEPENDENT VECTOR DISPLAY OF INTERNET CONTENT," the benefit of the filing date of which is claimed under 35 U.S.C. § 120. This application further claims the benefit of the filing dates of U.S. Provisional Application No. 60/211,019, filed Jun. 12, 2000, entitled "METHOD AND SYSTEM FOR RESOLUTION INDEPENDENT DISPLAY OF HTML AND XML CONTENT" and U.S. Provisional Application No. 60/217,345, filed Jul. 11, 2000, entitled "METHOD AND SYSTEM FOR SELECTION, RETRIEVAL, AND CONVERSION OF COMPUTER CONTENT TO VECTOR FORMAT FOR RESOLUTION INDEPENDENT DISPLAY," under 35 U.S.C. § 119(e).

The present application is also related to U.S. application Ser. No. 11/735,477 filed on Apr. 15, 2007, U.S. application Ser. No. 11/735,482 filed on Apr. 15, 2007, U.S. application Ser. No. 11/738,486 filed on Apr. 21, 2007, and U.S. application Ser. No. 11/738,932 filed on Apr. 23, 2007, each of which are continuations of U.S. application Ser. No. 09/878,097, now U.S. Pat. No. 7,210,099.

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to translation of Internet and World Wide Web content to scalable vector representation. More particularly, the invention relates to apparatus and methods for zoom enabling the display of content in an Internet information browser by retrieving and translating HyperText Markup Language (HTML), extensible Markup Language (XML), and other Internet content to vector representations of that content.

2. Description of the Related Art

Text only Internet information browsers began as a project at the CERN, European Organization for Nuclear Research, facility in Geneva Switzerland. From its inception the intent was to provide a mesh or web of access to data with a common user interface. Browsers moved from the academic environment when NCSA, the National Center for Supercomputing Applications at the University of Illinois in Urbana-Champaign developed Mosaic, an Internet information browser and World Wide Web client.

Internet content is stored in multiple file formats. These formats include HTML (Hyper Text Markup Language) and XML (extended Markup Language) as well as graphic file format GIF (Graphics Interchange Format) and JPEG (Joint Photographic Experts Group). These four file formats constitute the majority of Internet content. Font size and resizing display area for content can alter the size of the display of

Internet content in existing browsers. The majority of Internet content displays as a flat single resolution with no browser support for zoom.

Much of the Internet content has been designed for display on desktop computers with a single target resolution. Even though HTML has the ability to adapt to changes in screen resolution, major Internet content providers have chosen to create their Web pages using fixed resolution structures, such as tables. This gives them the ability to control the look and feel of their Web sites. This fixed resolution approach has evolved to the point that the fixed resolution layout of Web pages has become the most common method to brand or uniquely identify Web sites. While this fixed resolution approach is good for site branding and product differentiation it does present a daunting technical problem for display of Internet content (designed for desktop computers) on small screen, low resolution, or different aspect ratio devices, such as cell phones and hand held computers.

BRIEF SUMMARY OF THE INVENTION

In accordance with aspects of the invention, mobile devices enabled to support resolution-independent scalable display of Internet (Web) content to allow Web pages to be scaled (zoomed) and panned for better viewing on smaller screen sizes are disclosed. The mobile devices employ novel processing of original Web content, including HTML-based content, XML, cascade style sheets, etc. to generate scalable content. The scalable content and/or data derived therefrom are then employed to enable the Web content to be rapidly rendered, zoomed, and panned. Moreover, the rendered displays provide substantially the same or identical layout as the original Web page, enabling users to easily navigate to selected content and features on familiar Web pages. Display lists may also be employed to provide further enhancements in rendering speed. Additionally, hardware-based programmed logic may also be employed to facilitate various operations.

According to further aspects, some mobile devices may employ touch-sensitive display screens that enable users to provide various inputs to control display of content within Web pages. Exemplary user inputs include tap-based inputs to selectively zoom in on columns, images, and paragraphs. Users can also define a window to zoom in on via the touch-sensitive display.

According to additional aspects of the invention, methods and software for enabling support for resolution-independent scalable display of Web content are provided. The methods and software enable users of various devices, from handheld devices with small screens, to desktop PC's and laptops, to very large screen devices, to view and interact with Web pages in a manner independent of the screen resolution of such device's built-in or associated display, while maintaining the look and feel of browsing such pages with a conventional desktop browser. Thus, users of various devices having different screen resolutions are enabled to browse Web pages from among literally billions of Web pages while providing a full Web browsing experience.

Other features of the present invention will be apparent from the accompanying drawings and from the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The appended claims set forth the features of the invention with particularity. The invention, together with its advan-